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[54] SAFETY PLUG AND OUTLET
3 Claims, 6 Drawing Figs.

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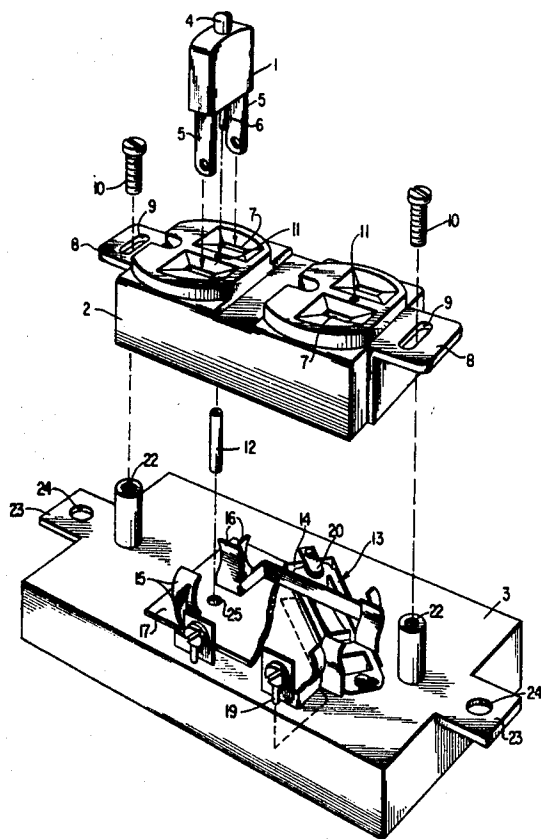
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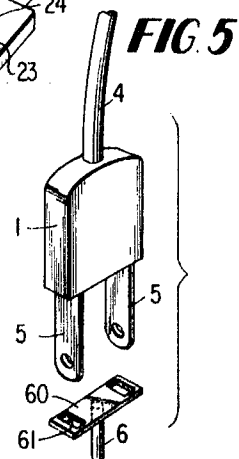
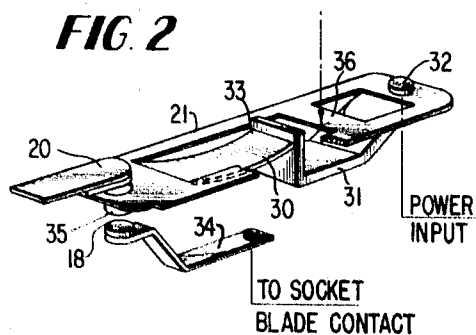
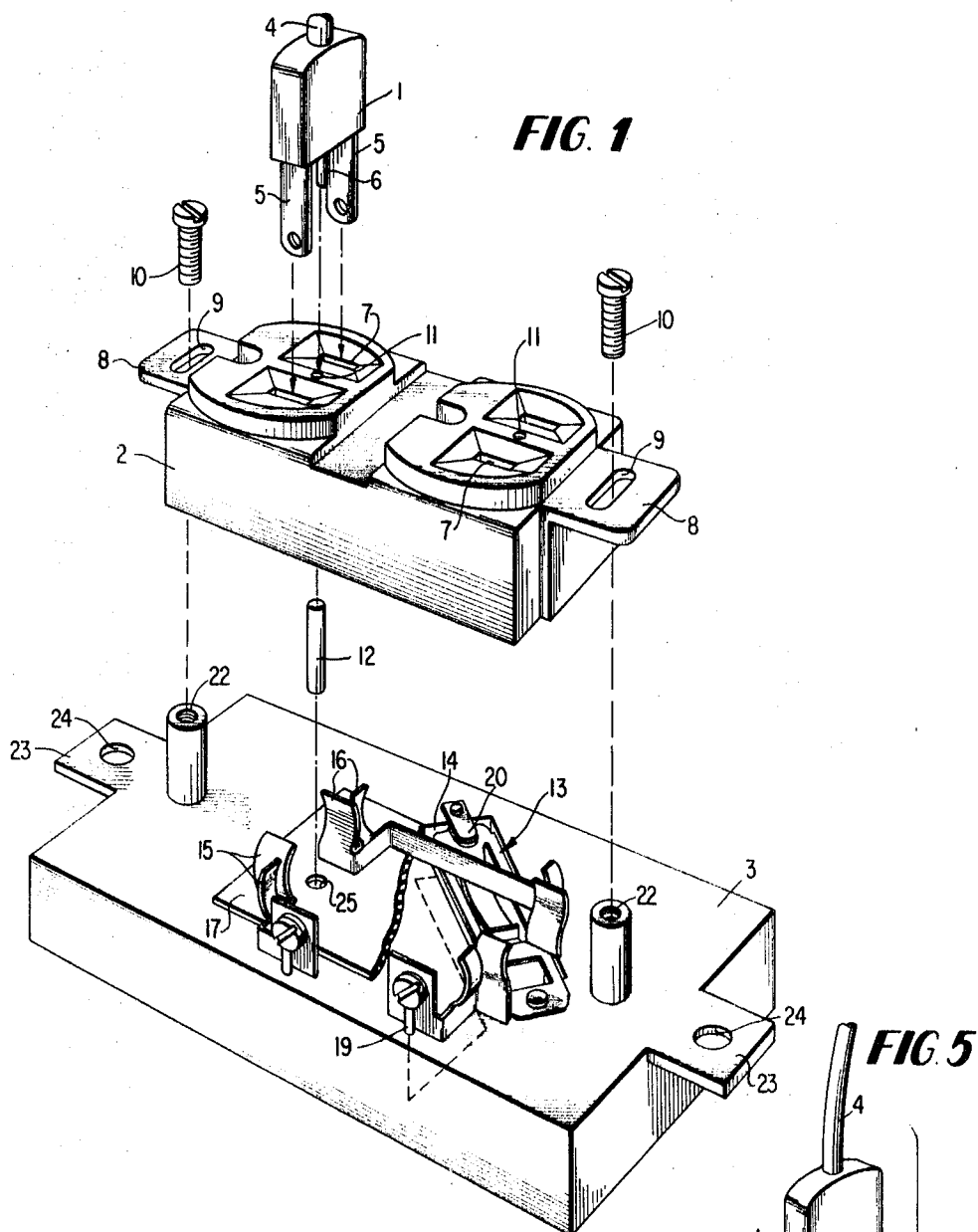
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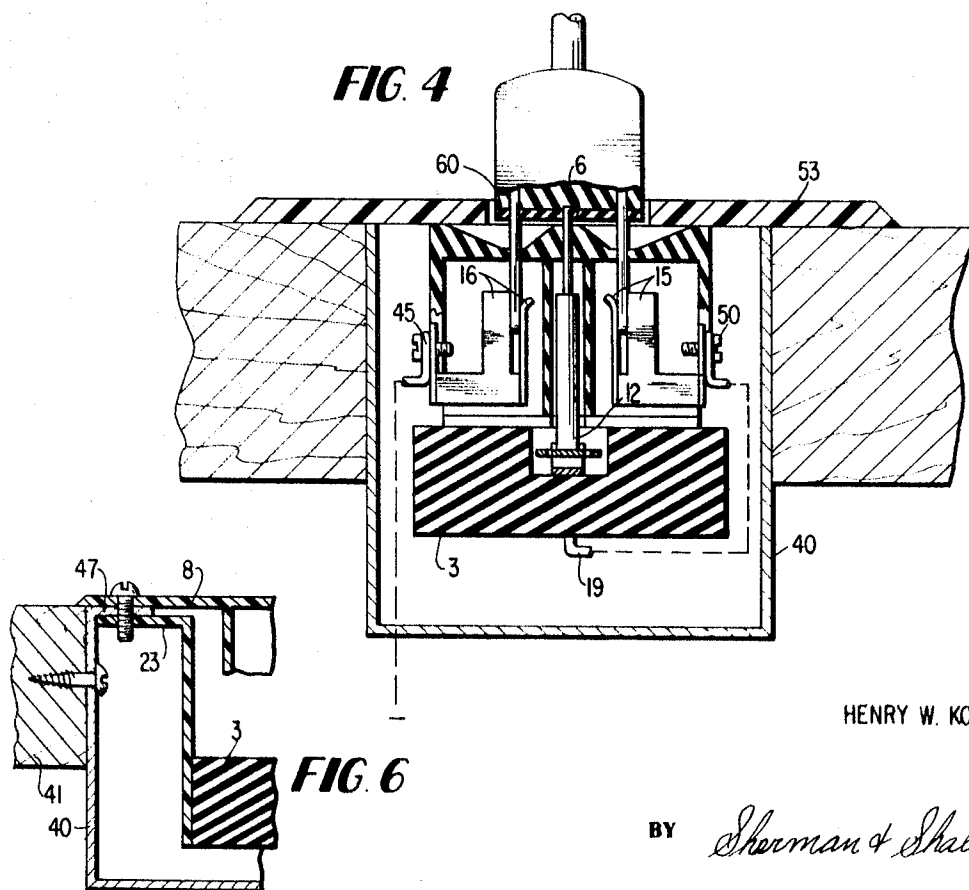
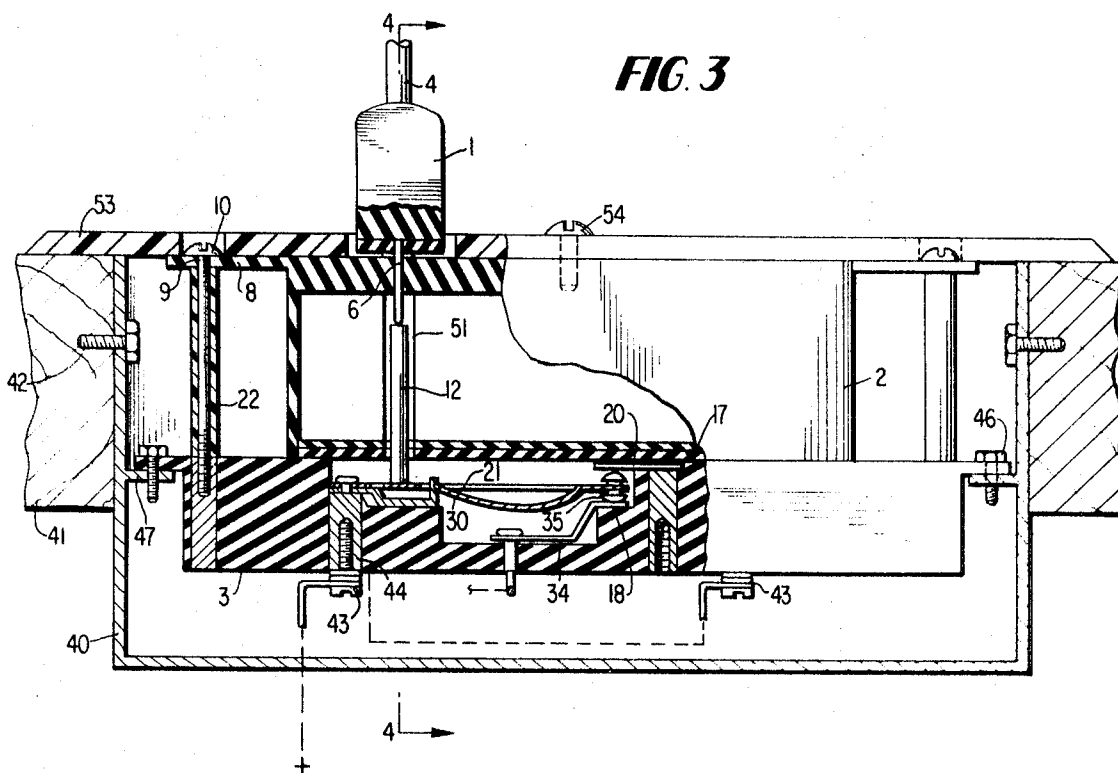
ABSTRACT: Disclosed herein is a safety plug and outlet which may be readily interchanged for a standard electrical outlet and which has a unique safety arrangement whereby it is practically impossible for a person employing the device of this invention to get an electrical shock when inserting the plug of an appliance or other equipment into the outlet. The device contemplates the use of a depressor in the plug which operates a switch in the positive line to the outlet so that no current flows to the positive contact blades of the outlet until the plug is practically completely inserted in the socket. By this arrangement, it is practically impossible for one to touch a prong of the plug which could be partially inserted in the socket and thus receive an electrical shock. The switch in the positive line may operate through the use of a snap-acting spring so that the connection in the switch is positively and securely made or else is biased open so that the switch will not flicker between an off and on position. The invention further contemplates an adapter which may be inserted into the standard junction box of an ordinary wall outlet so that the device of the present invention may be used without any significant structural changes in any area where its use may be desired.





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SAFETY PLUG AND OUTLET

This invention relates to electrical connectors and particularly to electrical connectors including a socket and plug with safety provisions for preventing the user thereof from getting an electrical shock when the plug is inserted into the socket.

Electrical connectors in the form of plug and sockets having safety features represent a highly developed art. However, there is a continuing effort on the part of industry and individuals to produce a safety plug of greater efficiency and one which is more economical to produce. The present invention is a product of such continuing effort and represents an improvement over prior art devices in its simplicity of design and ease of manufacture.

The device of the present invention assures that its user cannot receive an electrical shock while connecting the plug of an appliance to an electrical outlet and is particularly advantageous in applications where children are present and by their curious nature likely to attempt to use the plug. In these applications, children may often insert the plug in the socket only partially and thus leave an exposed prong of the plug which is connected to a live power source and thereafter contact such a live prong with some type of a cylindrical or slender instrument such as a screwdriver, toy or any other device which is susceptible to insertion in a narrow opening. If such a device is electrically conductive, the child could receive a severe shock, resulting in sometimes fatal injury.

With this situation in mind, I have devised a safety plug and outlet which avoids the possibility of a live prong of an electrical plug being exposed and which device may be readily interchanged into a standard home outlet or may be supplied as original structure in a home or other building where children are likely to attempt use of such devices.

The advantages of my safety plug and outlet over prior art devices are numerous. The device may be readily interchanged with standard wall outlets and adapters for standard plugs can be easily provided. The device is easily constructed and can be manufactured in great quantities at significant cost savings over other safety connectors. Construction of the device does not require any highly specialized or complicated components and most of the components of the device are available in the present market. The switch member in the positive power source of the socket is preferably controlled by a snap-acting spring so that there is no chance of sparking or shorting and the power supplied through the plug will not flicker or cut on and off in response to any jarring or other vibration that might be imposed upon the plug.

From this brief description of some of its advantages, it will be recognized that the invention has as its primary object the provision of a simple and efficient safety plug and socket.

Another object of this invention is to provide a safety plug and outlet that can be readily interchanged for a standard plug and outlet with a minimum amount of time and effort.

Still a further object of this invention is to provide a safety plug and outlet including a depressor element carried by the plug which operates a switch in the positive line power source to control the power passed to the positive contact blades.

Yet a further object of this invention is to provide a safety plug and outlet as above described wherein the switching mechanism includes a snap-acting spring so that the current is switched either full on or full off.

Still a further object of this invention is to provide a safety plug and outlet wherein no power will be supplied to the prongs of the plug until the plug is in the outlet to the extent that the prong is protected by the face of the plug.

These and other objects of the invention will become apparent to those of ordinary skill in the related art, when consideration is given to the following detailed description of a preferred embodiment, which is set forth as exemplary only, which description is given in conjunction with the accompanying drawings wherein:

FIG. 1 illustrates an exploded perspective of a device manufactured according to the present invention;

FIG. 2 illustrates in perspective the switch carried in the positive power line by the adapter of the present invention;

FIG. 3 illustrates partially in cross section an assembled device manufactured according to the present invention;

FIG. 4 is a cross section taken along line 44 of FIG. 3 and illustrates an assembled device constructed according to the present invention;

FIG. 5 is an exploded perspective of a standard plug and the false bottom adapter which may be provided in connection with the present invention; and

FIG. 6 illustrates in cross section a modified mounting arrangement in connection for the adapter and socket of the invention.

Referring now to FIG. 1, the plug 1, socket 2 and adapter 3 are shown in exploded relationship. The plug 1 may be a standard appliance plug connected through the cord 4 to any electrical appliance (not shown). The plug includes prongs 5 and has been modified with respect to a standard plug to include a depressor 6 which is provided for a purpose which will become apparent hereinafter.

The socket 2 is substantially a standard unit and includes the prong openings 7 and dog ears 8 having slots 9 through which screws 10 pass for connecting the socket to the adapter. The socket 2 is normally constructed of a plastic material which is nonconductive to electricity and a standard socket is modified to the extent that in the center of each plug face between the prong openings 7 is provided depressor opening 11.

The depressor openings extend completely through the socket and provide a channel for carrying the pegs 12 which are positioned in the channels for slidable movement axially of the opening.

The adapter 3 includes the contact blades for the prongs of the plug 1 which extend into hollowed portions of the socket 2. Switches 13 are recessed in pockets 14 of the adapter and are connected between the positive power source and the positive contact blades 15.

The positive contact blades 15 and the negative contact blades 16 are separated from the switch 13 by an insulator 17. The connection between the positive blades 15 and the contact 18 (FIG. 2) of the switch 13 is illustrated schematically by the line 19.

A stop 20 is provided on the adapter to position the switch arm 21 of the switch when the switch is in its open position as illustrated in FIG. 3. The adapter also includes channels 22 which are provided to receive the screws 10 for connecting the socket to the adapter. Tabs 23 having openings 24 are also provided on the extremity of the adapter for connecting the adapter to a standard junction box.

The insulator 17 has a hole 25 through which passes the peg 12 for depressing the switch arm 21. As is apparent, the depressor 6 and peg 12 could be a continuous unit passing through the depressor opening 11 and the hole 25 to depress the switch on 21. However, the arrangement illustrated in FIG. 1 is preferable since the use of a recessed depressor prevents the depressor from becoming bent or broken through use.

Referring to FIG. 3, the switch preferred for use in the present invention is illustrated. The switch includes a switch arm 21 which has an over center, snap-acting spring 30 integral therewith. The switch arm is connected to a bracket 31 as shown in FIG. 2 by a rivet or like structure 32 and the bracket includes a lip 33 beneath which the spring 30 is caught. Contact 18 on member 34 is provided for passing current when the connection is made with contact 35 on the underside of the switch arm 21. The member 34 is connected to the positive contact blades 15 through the line 19 illustrated schematically in FIG. 1 so that when the peg 12 depresses on the point 36 of the switch arm, the contact 35 is sprung into engagement with the contact 18 and the power input is thus connected to the positive contact blades.

By providing a snap-type spring 30 in the switch 13, when a slight amount of pressure is applied to the point 36, the connection between contacts 35 and 18 is assured through the bias of the spring. When the peg is removed so that no pressure is applied to the point 36, the spring 30 operates in the opposite or up direction so that the switch arm 21 is biased into contact with the stop 20. By this arrangement the connection between contacts 35 and 18 will not flutter or flip from off to on and so forth since the slight amount of pressure applied by the peg 36 is amplified through the spring and switch arm to ensure the connection between the contacts.

Referring now to FIGS. 3 and 4, the device of the present invention in assembled relation is illustrated. A wall junction box 40 is shown mounted on a wall joist 41, by screws, nails, etc., 42. In substituting the device of the present invention for a standard wall socket, the positive line source is connected at point 43 which is secured in the conductor 44 for passing current to the switch 13. There is a separate switch for each of the two outlets. The body structure of the adapter 3 is of insulation material to keep the socket from shorting out.

The negative line is connected to the negative contact blades 16 as at 45. Once the positive and negative lines have been connected to the adapter, the adapter may be mounted in the junction box by screws 46 passing through the tabs 23 and connected to the flange 47. As can be seen from FIGS. 3 and 4, the contact 18 of the member 34 is connected as at 50 to the positive contact blades 15.

Once the adapter 3 is mounted in the junction box 40, the socket 2 having the peg 12 within the channel 51, is connected to the adapter. The socket may be connected through the dog ears 8 with a screw 10 passing through the slot 9 and threaded into the internally threaded channel 22. When the socket 2 is mounted on the adapter 3, the insulator 17 is positioned between the contact blades and the switch 13 to assure that the contact blades are insulated from the power source connected to the switch. A plate 53 may then be mounted over the socket by a screw 54 and the device is ready for insertion of the plug 1. If the plug 1 is provided with a depressor 6, the depressor will force the peg 12 axially downward and cause same to apply pressure on the point 36 and make connection between the contacts 35 and 18. The snap-acting spring 30 will amplify the pressure applied to the peg 12 and bias the contact 35 against the contact 18. As the plug 1 is removed, the depressor no longer applies force to the peg 12 and the force of the spring 30 will operate in the up direction to open the switch and break the power supply to the positive contact blades 15. The dimensions of the peg and depressor can of course be regulated so that the depressor will operate the switch by force on the peg only when the plug is substantially flush with the face of the socket. The upward movement of the switch arm 21 is limited by the stop 20 which is insulated to prevent the device from shorting out.

If a standard plug is to be employed with the device of the present invention, an adapter in the form of a false bottom as is illustrated in FIG. 5 is necessary. The false bottom includes a plate 60 having slots 61 and a depressor 6. The false bottom or plate is slid over the prongs 5 of the plug 1, with the prongs passing through the slots 61 so that a standard plug is easily adapted for use with the device of this invention.

An alternative arrangement for the mounting of the device of the present invention is illustrated in FIG. 6. In this arrangement, the tab 23 is offset upwardly from the adapter so that it may be connected to the flange 47 along with the dog ear 8 of the socket. Since the flange of a standard junction box is usually provided at the mouth of the box as opposed to recessed within the box as illustrated in FIG. 3, a conversion unit will preferably have the mounting structure illustrated in FIG. 6.

As it is apparent, the device described as a preferred embodiment is exemplary only and various modifications will become apparent to those skilled in the art. For example, the switch 13 could be any of a standard variety including a pivoted lever depressing a contact member in response to

pressure of the peg 12 on the lever. The units 2 and 3 may also be of a one-piece construction. Further, the invention is readily adaptable for use in conjunction with three-pronged plugs, it being merely necessary to realign the components of the adapter in order to receive the peg and depressor provided on the plug.

The present invention can be adjusted to provide any degree of safety that is desired and the plate 53 may be constructed such that it would be practically impossible for any object to be inserted between the plug and the socket while the switch 13 is actuated to supply power to the positive contact blades. Further, a child would not receive a shock merely by inserting a conductive instrument within the opening leading to the positive contact blades since no power is supplied to the contact blades until the peg 12 has been depressed to actuate the switch. In order to receive a shock from the safety plug of this device, one would have to insert some type of an instrument in the depressor openings 11 and while holding the depressor in a compressed position, at the same time insert some type of an instrument into the positive contact blade openings. When the plug of the device is used to connect an electrical appliance, the dimensions of the depressor 6 and peg 12 are such that the plug must be substantially flush with the face of the socket before any power is supplied to the positive contact blades from which one could receive a shock by touching the positive prong 5. However, when the depressor is sufficiently inserted into the socket to depress the switch and cause power to pass to the positive contact blades, the plug is so close to the face of the socket that it is substantially impossible, without extreme effort and agility, to contact the prongs since the body of the plug fits over the face of the socket and may be recessed therein if desired.

The preferred embodiment of the invention has been described in detail and several modifications have been discussed. However, it is to be understood that the preferred embodiment is exemplary only and is not intended to limit the range of equivalents that are within the scope of the invention as defined by the terms of the appended claims. Further, the alternatives and modifications of the device of the invention as discussed herein previously are by no means exhaustive of the modifications that will become apparent to those of ordinary skill in the art and which will be equivalent of the express terms of the appended claims.

What I claim is:

1. A safety electrical outlet device for use with a plug having first and second spaced electrically conductive prongs and a depressor prong centrally disposed between said first and second prongs, said device including
 - a socket having first and second prong receiving openings spaced therein to receive said first and second prongs of said plug and a third depressor receiving opening centrally disposed between said first and second openings to receive said depressor prong of said plug when said first and second prongs of said plug are inserted in said first and second openings; and
 - an adapter attached to said socket, said adapter including first contact blades aligned with said first opening in said socket to receive said first prong of said plug, second contact blades aligned with said second opening in said socket to receive said second prong of said plug, an elongated, nonconducting peg having a first end slidable in said third opening in said socket and a second end, a first terminal connected with said first contact blades and adapted to be connected with a source of electricity, a second terminal adapted to be connected with said source of electricity, and snap-acting switch means aligned with said third opening in said socket and selectively connecting said second terminal with said second contact blades, said snap-acting switch means including a stationary contact connected with said second contact blades, a switch arm connected with said second terminal and carrying a movable contact, and a spring blade affixed to said switch arm and having a normal position and an operative posi-

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tion, said movable contact being placed in electrical contact with said stationary contact when said spring blade is in said operative position, said movable contact being spaced from said stationary contact when said spring blade is in said normal position, and said second end of said peg operatively engaging said snap-acting switch means such that said peg is forced against said snap-acting switch means to place said spring blade in said operative position when said depressor prong of said plug is inserted completely in said third opening in said socket whereby electricity from said source is supplied to said

second contact blades.

2. The device as recited in claim 1 wherein said second end of said peg engages said switch arm to force said switch blade to said operative position.

3. The device as recited in claim 1 wherein said plug includes a prong adapter having first and second spaced slots therein to receive first and second prongs and carrying said depressor prong at a central position between said first and second slots.

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